Appendix E

Air Quality Conformity Determination

Appendix E

Conformity Analysis

The air quality conformity analysis examined two aspects of construction regarding potential air analysis:

- construction equipment and worker commutes associated with on-site earthmoving activity; and
- construction phase emissions related to unloading of dredge material from dredge scows onto the site.

The conformity analysis was done for ozone precursors, specifically, reactive organic gases (ROG), and oxides of nitrogen (NOx), due to the non-attainment status of the San Francisco Bay Area for ozone.

Alternative 1 and 2, which involve the most amount of earthmoving and the most amount of dredge material placement was analyzed. If the analysis indicated that Alternatives 1 and 2 would be under the general conformity thresholds, then no analysis would be necessary for the Alternative 3.

Air quality impacts associated with dredging and transportation of dredged material, including air quality, are not analyzed in this document because they have or will be analyzed in the NEPA/CEQA documents prepared for individual dredging projects that may propose to dispose of appropriate dredged material at the BMKV wetland restoration site.

Onshore Construction Vehicle Activity Emissions Estimates

This section describes the methodology used to estimate the number of construction vehicles, employees, and worker commute trips associated with restoration construction activity.

As described in the Alternatives Description, each of the action alternatives includes three phases: Phase 1 – Site Preparation; Phase 2- Dredged Material Placement; and Phase 3 - Earthwork and Tidal Reconnection.

Phase 1 - Site Preparation will take approximately 1-2 years and will including onsite soil salvage and moving of soil, construction of temporary and permanent levees, and channel excavation. Phase 2 - Dredged Material Placement will take approximately 10 years in Alternatives 1 and 2; Phase 3 earthwork and tidal connection would take six months to one year. The total construction period would extend approximately 13 years in Alternatives 1 and 2, due to the length of time required to place dredged material. The most intensive onshore construction vehicle period is Phase 1 because it would involve the most construction vehicle and earthmoving activity. Phase 2, the dominant emissions activity is associated with offloading and placement of dredged material. Construction activity during Phase 1 was assumed to be conducted 8 hours a day for 200 days per year.

Construction Vehicles

The type and number of construction vehicles needed for Phase 1 construction were estimated. For this project, a maximum of eight scrapers and two compactors/ rollers would be needed for earthmoving and levee construction in Phase 1. These estimates are based on the total levee square footage and a 2-year time period to complete construction of the levees. Scrapers were assumed to be the primary type of equipment because they would be used to create the levees and berms using existing soil at the project site. The use of more than eight scrapers for this project could result in congestion problems because the vehicles would start to interfere with each other. A maximum of two compactors/rollers would be needed to compact soil as the levees are built up by the scrapers.

In addition to the scrapers and rollers, one loader and five dump trucks were assumed to be needed because a portion of the total levee fill may be obtained from on-site locations at distances that prevent the use of scrapers to obtain the needed fill material and potentially off-site locations. Additional support equipment, including a fuel supply truck, a water supply truck (for wetting down dry soil), a maintenance worker vehicle, and two pickup trucks. A total of twenty construction vehicles are assumed to be used at the peak of Phase 1 earthmoving and levee construction.

Construction Employees

The number of employees was estimated by assuming one employee per construction vehicle, for a total of 20 employees.

Daily Commute Trips

The number of daily worker trips was estimated. Thirty-eight daily trips were estimated for this project: 17 trips during the morning commute, 17 trips during the evening commute, and 10 trips during the lunch hour. The 17 trips during the morning and evening commutes assume that 14 workers commute in single-

occupant vehicles and that six workers commute in three double-occupant vehicles. During the lunch hour, 10 of the 17 vehicles were assumed to be used to buy lunch and run errands.

Construction (Onshore) Emissions Estimate

The highest level of worker commute trips would be generated during the first 2 years (Phase 1). During that time, site preparation including earthmoving and levee and berm construction would be performed. That construction effort is estimated to require 20 construction vehicles, 20 workers and to generate 17 trips during the morning and evening commute periods and 10 trips during the lunch hour.

As shown in Table E-1, the estimates of total annual emissions from construction vehicle activity of NOx and ROG during Phase 1 are 25.4 tons and 1.8 tons, respectively.

Dredged Material Unloading Emissions Estimates

This section describes the methodology used to estimate the emissions associated with unloading of dredge material and pumping it into wetland restoration cells at the HWRP including the BMKV site. This activity would take place during Phase 2- Dredged Material Placement. Estimates were prepared for use of marine support vessels and support equipment, for use of diesel unloading and booster pumps, for an alternative of using electrified pumps instead of diesel pumps, and for several hybrid scenarios. This estimate was prepared by Moffitt, Nichol.

Dredged Material Unloading Emission Estimate

Three scenarios of annual dredged material unloading amounts were considered: (1) a low-volume scenario (250,000 CY), (2) a medium-volume scenario (1.25 MCY); and (3) a high-volume scenario (3.5 MCY).

Nitrogen oxides (NOx) is one of the critical pollutants found in diesel exhaust. Nitrogen oxides are active ozone precursors. For this study, emissions for NOx were estimated as an indicator of unloading equipment that may pose a regulatory concern.

Estimates of air emissions were based on hours of operation for the following equipment:

- Unloader – Main pump (4000 hp), jet pump (800 hp), snorkel (800 hp) and generator (250 hp)

- Booster – Main pump (7200 hp) and generator (180 hp)
- Work Tug (750 hp)
- Crew Boat (400 hp)
- Loader (275 hp)
- Hydracrane (130 hp) – 2 each
- Dozer (165 hp) – 2 each

The equipment size (hp) was based largely on existing equipment of similar purpose.

Operating and standby hours were estimated for the unloader system. The total hours were based on 7 days a week, 24 hours a day. Standby time was separated as operational versus non-operational standby. For operational standby, it was assumed that only the generators would be operating. The generators would continue to provide power to the unloader (e.g. instruments, winches, office, lights) and booster although no pumps would be operating. The workday was still considered a 24-hour day. For non-operational standby, it was assumed that only the generators would be operating, but only for 8-hour days rather than 24-hour days.

Emissions were estimated using emission factors for the equipment described above. Factors for the unloader and booster were based on existing equipment of similar purpose and age. Three conditions for the power source were used to estimate emissions from the engines – unmitigated, mitigated and electrified. For the unmitigated case, all equipment was assumed to be diesel-powered with engines typical of existing equipment. For the mitigated case, it was assumed that emission reduction technology would be implemented on the main engines of the unloader and booster pump only. The reduction was based on the use of selective catalytic reduction (SCR) to the engines. SCR is an exhaust-after treatment and usually requires exhaust gas temperature between 600°F and 750°F. SCR is considered very effective in reducing NOx emissions; in excess of 90 percent.

For the HWRP project, unloader operations will include periods of time that the engines will be on standby prior to pumping. During the operational time for unloading the scows, the engine exhaust temperature will initially be less than required for SCR. To allow for warm-up time for the exhaust temperature, we have reduced the effectiveness of the SCR to account for a 30-minute warm-up period during a single scow offload time of 110 minutes. Therefore, for this study, the adjusted effectiveness of the SCR was reduced to 73 percent and that reduction factor was applied to the emission factors. For the electrified case, only the unloader and booster pumps were considered for electrification. All other equipment would remain diesel-powered.

Estimates of emissions were prepared for the following configurations:

- Unmitigated (all diesel equipment)
- Mitigated (Mitigate unloader and booster engines only)

- Electrified (unloader and booster)
- Electrified Booster/Diesel Unloader (unmitigated)
- Electrified Booster/Diesel Unloader (mitigated)

Dredged Material Unloading Emissions Estimate

As shown in Table E-2, the estimates of the unloading emissions vary significantly between the different equipment configurations and volume scenarios. In some cases, emissions would be above the 100 tons conformity threshold for NOx. Mitigation is recommended in Chapter 4 to reduce emissions below the conformity threshold.

Table E-1: Emissions Estimate for Construction Vehicles, Alternative 1 and 2

Commute Assumptions - Construction

	Commute	Lunch	Dump trucks	Pickup Trucks
Vehicles	17	10	5	2
Miles	15	5	10	10
trips/day	34	20	10	8
miles/day	510	100	100	80

Emission Factors (lbs/hr) - Construction

	ROG	NOx	Load Factor	Vehicles
Scraper	0.27	3.84	0.66	8
Roller/Compactor	0.065	0.87	0.575	2
Tracked Loader	0.095	0.83	0.465	1
Off-Highway Truck	0.19	4.17	0.41	2

Emission Factors (grams/mile) - Construction

	ROG	NOx	Load Factor
Dump Truck	1.22	8.45	1
Pick up Truck	0.24	0.6	1
Auto	0.2	0.39	1

Emisson in Tons/Year - Construction

	ROG	NOx
Emission for Construction	1.74	25.33
Emission for Commute/Lunch	0.03	0.07
Total Construction Vehicles	***1.8***	***25.4***

Table E-2: Emissions Estimate for Construction Vehicles, Alternative 1 & 2

Case	**1**	**2**	**3**
Dredge Material Placement Vol. (MCY)	0.25	1.25	3.50
Diesel Unloader (Unmitigated)			
Operating	47.23	118.65	332.92
Stand-by	21.70	19.75	13.89
Non-Operational Standby	0.00	0.00	0.00
Total	68.93	138.40	346.81
Diesel Unloader (Mitigated)			
Operating	18.68	46.94	131.70
Stand-by	21.70	19.75	13.89
Non-Operational Standby	0.00	0.00	0.00
Total	40.38	66.69	145.59
Electrified			
Operating	6.78	17.03	47.79
Stand-by	0.00	0.00	0.00
Non-Operational Standby	0.00	0.00	0.00
Total	6.78	17.03	47.79
Diesel Unloader (Unmitigated)/Elec. Booster			
Operating	23.56	59.19	166.06
Stand-by	12.00	10.92	7.68
Non-Operational Standby	0.00	0.00	0.00
Total	35.56	70.11	173.34
Diesel Unloader (Mitigated)/Elec. Booster			
Operating	11.85	29.77	83.54
Stand-by	12.00	10.92	7.68
Non-Operational Standby	0.00	0.00	0.00
Total	23.85	40.69	91.22